

Technology of Biochemical Analysis

Include Radiochemical Analysis and Laboratory Analysis by MARLAP

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Abstract- The main purpose of paper argues for the assurance-based on data result of low-concentration chemical analysis. The data of high Quality Accuracy (QA) are needed in many fields, especially, radio-biochemistry and environmental chemistry. QA of chemical analysis result needs to be maintaining reliance and an assurance for quality management. Reliability is based on the transparency of information and execution of social responsibility by ISO 26000. The many international organs and agency have promoted making the rules for QA. Representation rule is protocol of MARLAP by EPA and it is recommended by IAEA and ICRP. Safety and reliance needs the sustainability management with high quality control level. The improvement technology of QA utilizes traceability by Quality Engineering (QE) and standardization by ISO-GUM for quality accuracy. Since the factor of uncertainty influences, it should be careful of especially the Biochemical analysis of very low concentration.

Keywords- ISO-GUM; MARLAP; Uncertainty; Chemical; Analysis; Low Concentration; MCMC; QA

I. INTRODUCTION

In the biochemical analysis is making which evaluates low concentration like environmental pollution, since the factor of multi- variance which bio-material has exists specially. It has required the highest accuracy and high reliability data for risk control [1]. The guidance to the analysis model has been about QA of chemical analysis in the related many organizations which are. EPA, ISO, IAEA and EURACHEM/CITAC [2]. The main guidance by ISO-GUM (Guide to the expression of Uncertainty in measurement) is used which it changed into the evaluation mode of expression ambiguous data from error to uncertainty. Furthermore, Markov Chain Monte Carlo (MCMC) in supplement 1 of ISO-GUM and Multi Agency Radiation Laboratory Analysis Protocol (MALAP) techniques were taken into the operation method.

The risk management is needed for the measured object about a low concentration chemical analysis on the Social Engineering (SE). The problem of concerning safety and security is also primary importance, it promotes research of risk control with the concept "Reason and Result (R&R)" rather than "Research and Development (R&D)". The experiment object is created the evaluation of three limits risk management. These are a detection limit, a determination limit and a reliable (information) limit. This purpose is acquisition of the chemical analysis for obtaining the best well-result.

II. METHODE OF ANALYSIS

A. Proceeding of Analysis

The uncertainty is typically expressed as estimated the Standard Deviation (SD) to used ambiguous data. It is called a standard uncertainty (U_s) in ISO-GUM. U_s is evaluated each input quantity. The observe data (S_n) are collected by statistical method or by other method that exists in ISO-GUM.[4]. n is a order number of each multi-samples in Gibbs method.

B. Modeling

The modeling is defined in Supplement 2 of ISO-GUM. The sampling formulation of model expressed the mathematical relationship between measurand Y and input quantities S_n in equation $Y=f(S_1+S_2 \dots S_n)$.

C. The algorithm of Analyzing and result

If variation uncertainty data on samples are there, it will prepare two or more same samples and make one average. In the many cases where exists two or more standard uncertainties (U_{S_n}) groups, it calculates the combined standard uncertainty U_c by least squares Equation. (1) within ISO-GUM

$$U_c = \sqrt{U^2_{S_1} + U^2_{S_2} + \dots + U^2_{S_n}} \quad (1)$$

D. Data Sampling

An analysis sampling is started from the modeling structure for the analysis plan that is the release critic data obtained to translate in an analytical process. The sampling is performing by MCMC that is profiting the BUGS (Bayesian inference Using Gibbs Sampling). It is useful computer software for the Bayesian analysis of complex statistical models [5]. The MCMC has

decided the Supplement 1 of ISO-GUM that is treated the numerical calculation of measurement uncertainty by strategy plan of "Law of Propagation to Uncertainty (LPU)" on Exploratory Data Analysis (EDA)

E. Diagram of Overview of Analysis Process

In the MARALP, The concept of the general remark about a chemical analysis is shown by the system diagram,

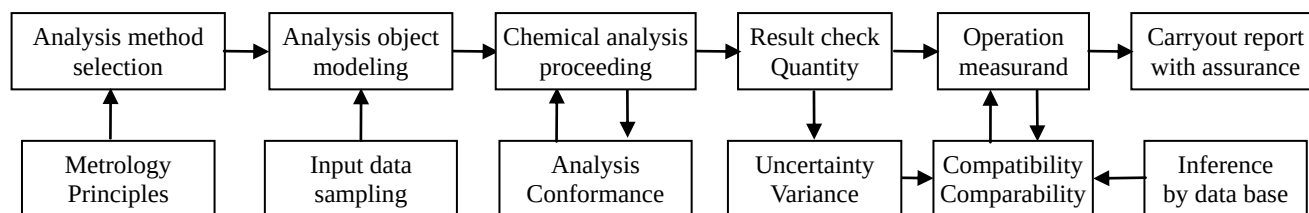


Fig. 1 The system diagram of analysis process

F. Correction Factor for Standard Uncertainty

If correction data is necessary for with assurance in conformance zone, it calculates an expanded uncertainty Ue by multiplying the combined standard uncertainty Uc with coverage factor k . by Equation (2). [6]

$$Ue = k * Uc \quad (2)$$

k is called a coverage factor for coefficient of expand uncertainty which is made to on expand uncertainty Ue . It is making the expand uncertainty zone in ISO-14235-1 of Fig 2 as it defines the guidelines of two clear limits as lower and upper. Both limits have an uncertainty zone that situates in a gray zone of the increasing uncertainty, and it is set up by a coverage factor. to each of two limit positions The conformance zone for an assurance performance is prepared between two border lines of increasing uncertainty, and the non-conformance zone is setting out side of the uncertainty zone If a coverage factor k presupposes that the number of samples is infinite, it will generally be set to 2. If there are few samples, a coverage factor will be an increasing. It is calculated to compensated sample size by Welch-Satterthwaite Equation (3)

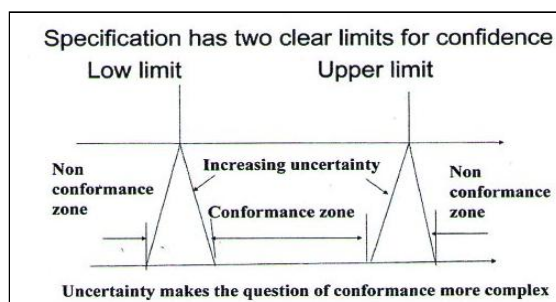


Fig. 2 A conformance and uncertainty an assurance zone by ISO-14235-1

$$V_{eff} = \frac{u_c^4(y)}{\sum_{i=1}^N \frac{c_i^4 u^4(X_i)}{V_i}} \quad (3)$$

where V_i is the sample quantity, and Uc is the combined standard uncertainty. N is number of samples. Effective Free Degree (EFD) V_{eff} is improved maximum likelihood function for conformance zone and a calculation result is useful to draw out from a statistic table to obtained coverage factor k . [8] The V_{eff} calculates useful the measurand of prior distribution in Fig. 3.

The measurand is compared with Discrimination Level (DL) and Action Level (AL) for Uncertainty of Measurements Ratio ($U_{MR} = [AL-DL] / \text{sum of error rates}$). An increasing uncertainty zone is the width of the interval between the upper bound gray region (UBGR) and the lower bound gray region (LBGR). An uncertainty is estimated on equation of $UBGR-LBGR = \text{coverage gray zone}$.

He assurance certificate is given only to the data which fall into the conformance zone of data set forth in ISO14235 (Fig.2).

G. Key comparison.

In a chemical analysis, a reference value is selected by a key comparison method which is useful in many cases without

deciding the standard trueness. The key comparison is useful between the null hypothesis by prior distribution with measurands and the frequency hypothesis by means of posterior distribution based on a data base in Fig. 3.

A reference value is derived from a posterior distribution by a frequency database. The primary work defined the reference value of the measured result which is useful in a chemical quantitative analysis. In Fig 3, the likelihood of posterior distribution is shown as deviance form in Fig.3 .Prior distribution and posterior distribution as information criteria are a key part of Bayesian inference.

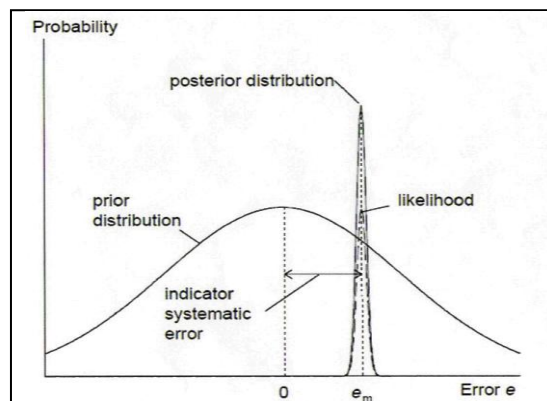


Fig. 3 Prior distribution and posterior distribution

In A Information Criterion (AIC) for likelihood evaluation, it is particularly useful in Bayesian inference, in which the posterior distribution has been obtained by means of MCMC simulation. And Multi-variance Analysis in supplement 3 of ISO-GUM is useful a multi-regression analysis for large ambiguous data that is as in a low level concentration. The policy of EPA has a program, it called "Mandatory QA program", and it is produced by the Office of Environment Information (OEI). The MARLAP manual of EPA is carried out by uncertainty data.

An uncertainty datum is raised up at higher grade by performing an accuracy management. MARLAP of EPA is advanced for the lowest concentration chemical analysis on based on the mandate analysis with IAEA.

H. Compatibility of limit dose level with EPA and LAES

IAEA is also made the mandate about the radio-chemical analysis of a low dose for radiological protection. The difference are limited level in the definition in the low concentration chemical analysis with IAEA and EPA, which is shown in table I

TABLE I DIFFERENCE IN THE DEFINITION OF EPA AND IAEA

Item	EPA	IAEA
Limited dose	DL (TL) TEDE	MPD CEDE
Radiation exposure	The public	The worker in plant
Detriment	Determinist effect	Stochastic effect
Analysis	effective damage in human cell	damage occurrence probability
Level	DCGL (AL)	LPL
Detection limited	ALARA	DL/DMA

ABBREVIATION

DL: Discrimination Level
 TL: Threshold Level
 MPD: Maximum Permissible Dose
 TEDE: Total Effective Dose Equivalent
 CEDE: Committed Effective Dose Equivalent
 DCGL: Derived Concentration Guide Level
 LPL: Lowest Possible Level
 ALARA: As Low As Reasonably Achievable
 DL/DMA: Decision Level / Detectable Minimum Amount

The IAEA recommends the regulations which can ensure the safety of plants with risk. It is needed to utilize the LPL based on DL/DMA whose analysis is an analysis limit about the exposure doses level.

The EPA is making an agreement between many agencies in order to protect the radiation risk to the public who are unrelated to radiologic work that is kept safety and secularity. It views the absorbed dose through the effect of equivalent dosed as important. The low dose to measure is estimated ALARA for Discrimination Level (DL =Decision Level based on DCGL or TL).

DCGL is threshold value which the obstacle drawn by EPA for crisis management generates. These doses are decided with the threshold value of identifying minimum active level. It is exceeding an over background.

III. GENERAL REMARK.

A. Feature of ISO-GUM

ISO-GUM is divided into two sections of Type A and Type B. The feature of GUM added the Exploration Data Analysis

(EDA) of Type B to the conventional ANOVA of Type A, The difference between Type A and Type B is summarized in Table II.

TABLE II THE DEFERENCE TYPE A AND TYPE B

ISO-GUM	Type A	Type B
object	Normal only	Abnormal OK
Analysis method	Statistic ANOVA	Other method EDA
Algorithm	linear	Non-linear
express	error	uncertainty
Estimate	Regression	Fluctuation
test	parametric	nonparametric
theorem	large number law	Central limit theorem
Express	Error	Uncertainty
standard	Known standard	Unknown reference
hypothesis	frequency	null
report	statistic	illustration

Fig 4 shows the component of the relation between an uncertainty and error. Table III contents with error is summarized in Table III and shows the relation between kind of error and expression of term. In order to evaluate the uncertainty in the analysis data is useful Probability Density Distribution (PDF) data and doing by Law of Propagation to Uncertainty (LPU).

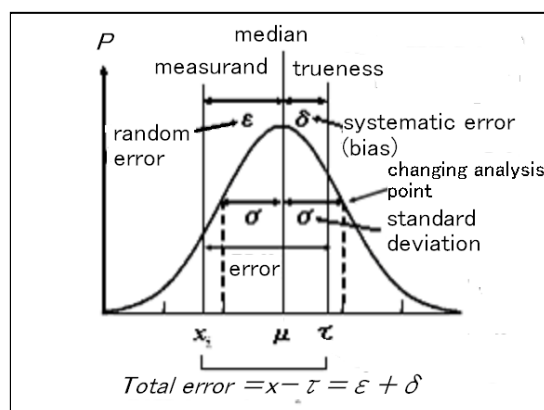


Fig. 4 Total error and Table.III. Kind of Error and Trueness

TABLE III KIND OF ERROR AND TRUENESS

Performance characteristic	Kind of error	Expression of term
Trueness	Systematic error	Bias correctable
Accuracy	Total error	Uncertainty
Precision	Random error	Not correctable

ISO-GUM is useful MCMC method in Bayesian inference for the grad up of quality of measurement data that is numerical methods for LPU. It is edited by JCGM. Document number is JCGM 101 for ISO-GUM in 2006.

The GUM gives advise how to obtain standard uncertainty, if the input quantity distribution is abnormal. In this case, the procedure for the concrete operation of MCMC is shown in Fig.5 which is recommended the NIST.

In Fig 5, the system diagram of MCMC evaluates the accuracy of the analysis data which extracted from the detector. Input data conducts three kinds of statistics distribution in the first stage. Analyzer used conventional PDF series which are rectangular distribution, t-student distribution and normalized distribution. Input data conduct .to same time on input port.

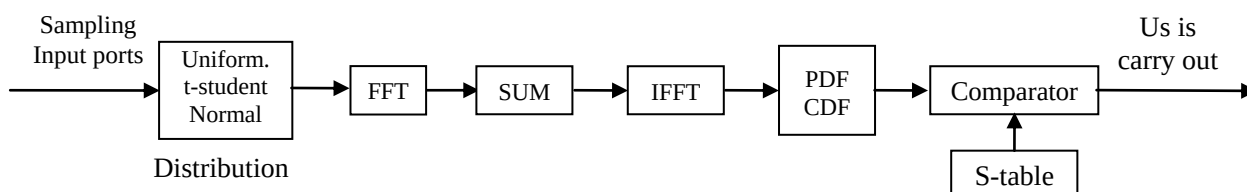


Fig. 5 Structure of algorithm process for MCMC [7]

Uniform (or rectangular) distribution: it determines a useful interval between maximum and minimum.

t-student distribution: it conducts statistics analysis as abnormal distribution. It define reject area,

Norma: normal distribution (PDF) conducts statistics analysis as normal distribution.

FFT (Fast Fourier Translation) performs separation of signal and noise.

SUM: it compounds the one out put from three signals.

IFFT: it returns the data disassembled by FFT to the original form, and makes it a normalize distribution.

CDF and PDF: these calculate the exploration of the cause of uncertainty, and make the coefficient for biasing..

Comparator: it compares present (prior) data inference (posterior) data..

S-table: Statistic table

The supplemental.4 of ISO-GUM have prescribed that it perform the standard procedure for Data Quality Assurance Object (DQAO) in the following six step for a low concentration chemical analysis.

- Step1. State the Problem by Bayesian inference
- Step2. Identify the Decision to sampling method
- Step3. Identify the Inputs to the Decision
- Step4. Define the Study Boundaries
- Step5. Develop a Decision
- Step6. Specify Acceptable Limits on Decision Errors

B. QE (Quality Engineering)

QE is starting analysis from hierarchical gradient-based motion estimation of fault factors though “Failure Mode and Effects Analysis (FMEA)”. Next, it determines the root cause of the fault element though “Root cause analysis (RCA)” and “Fault Tree Analysis (FTA)” These are mining out cause of uncertainty by strategic sampling.

Fault-injection technology and alternative QC is important newly. This experiment used for finding out the cause of generating source of uncertainty [6], it is same as EDA in ISO-GUM. QA of result is using the safety control for making a safe limit well known.

The equivalent QC is also an important for obtaining an assurance and reliance. In the medical field, it has obtained good point of care to clinical treatment in the wide area for IT-ear, it is useful unity of both feature ISO-GUM and QE.

The difference between ISO-GUM and QE is shown in Table IV. It is useful unity of both feature ISO-GUM and QE.

TABLE IV COMPARISON BETWEEN ISO-GUM AND QE

Item	ISO-GUM	GE
Estimation.	Uncertainty	Error
Process	Key comparison. and LPU	FMEA FRACAS FTA & RCA
Final result	Conformance	Tolerance
Critical value	Reference value	Standard value
Algorithm	MCMC & MA Modeling	Quadratic equation
Express	Illustration	Formula
Unit	SD	Error %

C. MARLAP and EPA

MARLAP manual provides for low doses measurement of radiation in laboratory analysis in order to protect the safety of the residents near nuclear plant installations. They give guidance for the human health care and preserve the environment assessment these used the result of chemical analysis as the based to reliant for risk control by MARLAP that is endorsed the ISO-GUM, and it recommended by the NIST as the best way to ensure mutuality among the many international collaborators [2].

MARLAP exists as an international protocol of the EPA in the EPA 402 series and 240 series. It was produced for the best risk monitoring system manual in area as surrounding nuclear plants.

The basic goal of the manual is to ensure the reliability of the data of the radiochemical analysis in the laboratories. It includes guidelines for the decontamination control of radioactive materials. It contains a framework for decommissioning projects.

The EPA planned for a transition to safe environment assessment from risk environment assessment around nuclear plant installations. QE has progressed in following procedure to Accepted Quality Limit (AQL).

D. Risk Analysis System and Management

To protect the public from ionizing radiation of low dose, three limits of these are advocated by EPA. Such three limits are

the low dose detectable limit, information limit, and confidence limit. These are the following three important requirement items in ISO-11929.

(1) Justification of the accuracy in measurement, if the action level is higher than a threshold level that is only included the bio-logical effect without background.

(2) Optimization of the protection of the general public for the health care of contaminated persons.

(3) Constraint of the dose limit that is the influence and the limit of the total effective doses to the population contamination, in this case, the “ALARA” and DL/MDA standard are important that the reliable information be kept to always be transmitted.

These limits are set to aid in product planning in decontaminative work in and around the nuclear plant. These principles of the protection to the ionization radiation which IAEA defines them are distance, shield, and time.

E. Low dose Limit

In the field of biochemical chemical, the detector limit needs to evaluate for DL and MDA of chemical analysis with kinetic characteristic [7]. DL is shown specific and MDA is shown sensitivity DL and MDA is important for the marginal utility analysis of dangerous value. Both are defined by ISO 11843 series and ANSI1330, these need critical standard (reference) value for analysis. ISO-2859 is indexed on limiting quality comparison as feature is shown in Table V. DL and MDA need to clear the background and bias in zero based. A chemical kinetics reaction case is shown volatility model that is detectable limit on the unstable start region with the resistance property detectable limit on the unstable start region with the resistance property kinetics reaction curve that response curve is non-linear of dotting curve in Fig 6.

$$\text{Product } S = A d S n^2 / d t_2 + B d S n / d t + C S n \quad (4)$$

TABLE V COMPARISON OF BETWEEN DL AND MDA

Item	DL	MDA
Former Name	Critical Level(Lc)	Detection Level (L _D) and Lower Limit of Detection (LLD) or Discriminator LLD
What?	The lowest Action Level (AL)	Not an action level
Use	Compare measurand to DL (DCGL)	Use in statement of work: to advertizing, planning, of counting services in MDA.
When?	It product after an experiment.	It product before an experiment.
Defined	HPS/ANSI N13.30	HPS/ANSI N13.30
Turner's name	Minimum significant activity	Minimum detectable true activity
Strom's name	False alarm level	Advertizing level

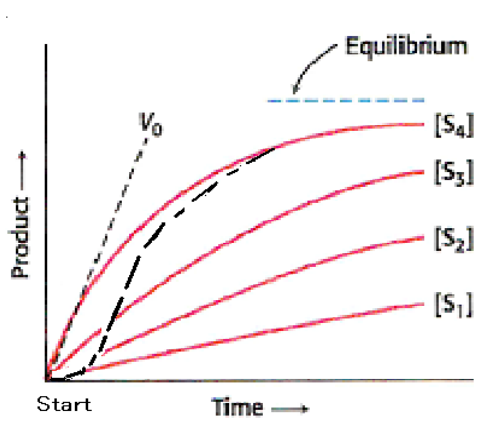


Fig. 6 Chemical kinetics reaction curve with bioassay

Fig.6 shows the increase state of the reaction product on lapsed time.

The reaction result for evaluation holds the expression of concentration relationship response on time that is “adaptive response = condition product + challenge product” as three phases processed.

A reaction result shows in a sigmoid curve of three phases as a dotted line in Fig.7. Normal reaction is ongoing as red line.

Phase 1: A reaction start domain needs analysis knowledge of resistance in the reaction system, and there exists a threshold of the reaction starting point. It includes the allosteric effect and inhibition effect. This corresponds to the secondary differentiation analysis portion of the first clause of Equation (4). It needs excellent DL/DMA for the lowest dose. It performs on hyperbola analysis.

Phase 2: Kinetics-state stochastic-metrology estimates the base in experimental measurements and useful Metabolic Flux Analysis (MFA) methods. It is corresponds to the first differentiation analysis portion of the second clause of Equation (4).

Phase 3: Through stochastic-metrology process of a steady-state, it identifies the concern of chemical equilibrium. This corresponds to the constant factor of the last clause of Equation (4). It is when a reaction product reaches saturation. S is a product quantity of damage and, n is the quantity of S in the Total or Committed Effective Dose Equivalent (CEDE). A , B and C are constant factors.

The analysis for evaluation AL holds the expression of dose relationship response as a multi-stage processed.

A changing point analysis of bio-chemical reaction on a dotted line is performed on a series of timeline ordered data. The purpose of searching for a changing point uses the changing state of a reaction for evaluation. The kinetic variance state advances in three steps as Equation. (4). A dangerous obstacle is generated in action zone beyond a threshold value.

DCGL is setting on equilibrium as AL. The analysis for evaluation AL holds the expression of dose relationship response as a multi-stage processed. The evaluation of the response analyzes by the expose Dose and Dose Rate Effectiveness Factor (DDREF) expresses the process of the biochemical reaction modeled with a differential Equation (4).

The DL applies to counting measurements made by high resolution spectrometry without the influence of sampling treatment conditions or background. It is obtained from a priori information of measurements that can be detected the smallest counting rate of a net peak area in distribution. The smallest expectation value is the probability of incorrectly not rejecting the null hypothesis.

The existence of two or more uncertainty elements will be calculated to useful Multi-variance Analysis (MA) and multi regression analysis in supplement-3 of ISO-GUM. Non-linear reaction is shown as y stochastic-metrology base of the biochemistry.

IV. PROCEDURE OF A CHEMICAL ANALYSIS

Important portions are the following three sections in a reaction result in analysis process.

1) "Release criterion" is a regulation limit expressed in terms of dose A release criterion is typically based on TEDE or Committed Effective Dose Equivalent (CEDE) for the body. TEDE is the sum of the Expose Dose Equivalent (EDE) "Translate" means translating the cleanup and release criterion into a corresponding derived contaminant concentration level, through the use of environmental pathway modeling.

2) "Decide" refers to determining the data that obtained from sampling doses. It supports that the site meets the release criterion. An acceptable degree of data of uncertainty is estimated through the application of a statistically-based decision rule by type A

The Exposure pathway modeling is used to calculate a radio-nuclides-specific that prediction of the dose in the survey position and the concentration of specific nuclides.

3) "DCGL" is designed to be the radionuclide concentration variability in three classification survey units which are the small area unit, large area unit and reference area unit of the background. These doses are decided with the threshold value of identifying active level. It is exceeding an over background or base drift line.

Variation of measurand in the survey units is determined from posterior surveys units. The Variation in data would be suitable due to instruments, the candidate values use for LBGR. The cost of measurements as sensitivities is needed to measure the candidate value for LBGR in .Fig 2. A survey unit could possibly fail even though its average concentration was in fact less than the LBGR.

An internal dose-metrology program is issued with document 10 CFR part 835 that is decided the radiological control policy guideline, and it contained occupational radiation protection (DOE G 441.1-3:03-17-99). Another is the Department of Energy (DOE) standard of internal dose-metrology (DOE- STD-1121-03) and DOE laboratory accreditation program (DOE-STD-1112-98-1198). And the medical field is useful standard ANSI/HPS N13.30 that is "Performance Criteria for Radio-Bioassay", and the. ANSI N13.39 is design of an internal dose-metrology program.

An analysis method is designed for new system use or an upgrade an exist system for the use of analysis results. It determines the best equipment for the particular sited equipments, and it compares experiences data with other operators concerning as particular equipments. An analysis is as follows and the work of QE.

- 1) Identification of information (It is predicated the buried source of uncertainty in observed input data)
- 2) Recording and auxiliary equipment (It record analysis assessment)
- 3) Unit information total system. (It performs total quality control of the uncertainty data.)
- 4) Off-site data source (It make the summary of experiment data and to transfer database)
- 5) Meteorological tower information (It includes in a central data integrated system)
- 6) Maintenance and calibration (It always calibrates and secures reliance and accuracy)

- 7) Variable monitored (It monitors the object with variable characteristics periodically.)
- 8) Data processing and archiving (It makes the obtained data into an archives)
- 9) Meteorological instruments (It maintenances of used instrument)
- 10) Administrations (It makes a final goal correspond to internationalized level of general management for IT era)

A new edition is in the future of survey.

- 1) Some information is outlier-data (It eliminates thoroughly the outlier element contains in uncertainty data)
- 2) Facilities have changed operational status (It eliminates facilities facility element in operational process.
- 3) New facilities are planned (It infers the new facilities by fault injection quality control)

In the radio chemical analysis, the final data reports about designing methods and reference material to Final Status Analysis (FSA). The radiological control policy of guideline in the 10 CFR 835 shows radiation exposure of the work force and members of the public shall be controlled such that their radiation exposure is well below the national regulatory limit and there is no exposure without commensurate benefit as justification. All radiation exposures and intake body shall be below ALARA as optimizing limit.

Individual doses are maintained below the regulatory dose limit. Excellent performance is evident when levels below regulatory limits are maintained, then radioactivity is safeguarded against.

The majority of analysis does on the reaction curve at a changing point that is an instability area as a malignant progression.

The result can be to guide investigation of a changing point to the root cause of apoptosis in biology as an example It is believed to be the care point that have occurred the first change point as a control limit. The care point appears due to various fault root causes of detectable irregularly. They are existence of a reaction inhibition substance or assessment changes.

Test results of one or more element are commonly interpreted at public health care based reference intervals on long and short terms. It is irrespective of whether the testing has been a point of care testing or clinical laboratory testing. Reference intervals of health care for generating radiation the effect are setting the difficulty by report.

The laboratories must adopt a pragmatic hierarchy of approaches to be able to fulfill this requirement. Such data are obtained from frequently kinetics state which uses an instability area in individual chemical reaction curves.

The reaction change may have irregular actually occurred in several points. Performing a change point analysis will help to better isolate the exact time and nature variable change. Another area of application is for fault behaved data, such as particle counts, microvial counts and complaint data. Such data typically do not follow the commonly used distributions and may contain numerous outliers. A change point analysis can easily handle such fault data, and large data sets consisting of thousands of values, and providing confidence interval for the timeline of change.

V. EXPERIMENT

A. First Step (Sampling preparation)

Data Quality Object (DQO) improves the accuracy of calibration curve used for the quantitative analysis. It is important as intermediate accuracy in total analysis system.

The first step prepares the test reagent of product sakes for calibration curve which it uses for the experiment. The objects are as homeopathic test reagents of Radio-Immuno-Assay (RIA) [9]. RIA is clinical examination method which uses a radioactive material for a detection maker. Maker is I-125 radioisotope. The feature of RIA is very excellent sensitivity. It is chosen the Elastase-1 as principal samples, and added using one sorts of regents as check of data [10]. RIA method is one kind of Blood Chemical Analysis (BCA). This step products the calibration curve of test reagent for every rot, and several test reagents for different concentrations (doses) which is arranged harmonious in the shape of stair ways in Fig 8. It's created by applying regression analysis with the standard sample of known dose well. The critical number sample for statistic analysis is made of more than 100. In this experiment, prepared regents are Elastaze-1 and Plasma rennin activity. The Elastaze-1 reagents prepared six sorts dose which are 0, 50, 150, 500, 1500 and 5000 dose. It uses total 320 samples in this experiment. The reagents of Plasma Rennin Activity are 6 sorts dose which are 0.2, 0.8, .2.0, 8.0, 20 and 80. It use sample 100 samples. Dose is concentration in international catalyst units (IU).In RIA, it is measured by the competitive reaction of the between antibody and antigen. An antibody and a non labeled antigen prepared first, next the labeled antigen is added to the labeled antigen. And it makes for quantity analysis by a comparison method with both reagent reacts. After a reaction advances to equilibrium stat. it separates into the reaction product and non-reactive samples in this experiment. It denotes a reaction evaluation of a reaction result by an affinity coefficient (%) which is an affinity labeling as an effective reaction rate (%). The first step is to create posterior distribution by measurement result of the rot reagents of standard dose in order to set up a reference value which is used for quantity analysis by a comparison method.

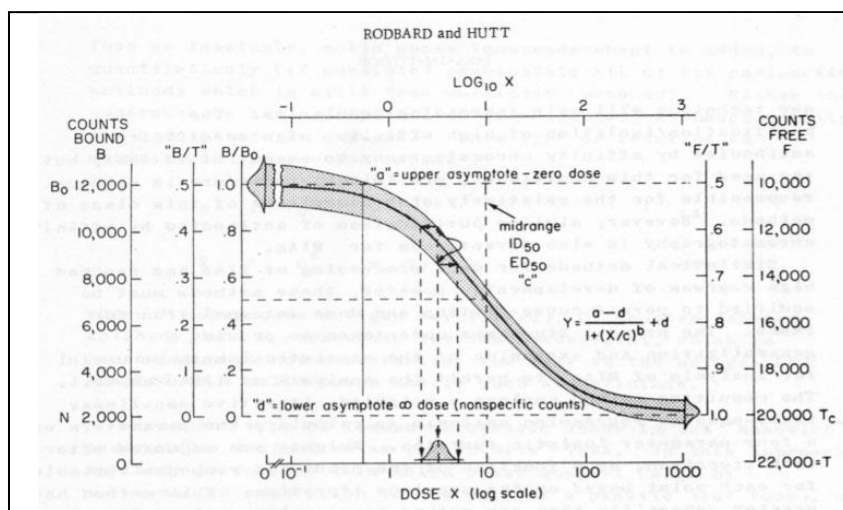


Fig. 7 Schematic dose calibration curves

B. Second Step (Statistics Data)

The conclusion of the amount of the fundamental statistics by measurement result is shown in Table VI. In this case, statistic distribution is an abnormal, it carried out to make of data by adding the technology of soft-computing which are chaos and fuzzy.

TABLE VI THE COMPUTED RESULT OF STATISTICAL VARIABLE

Dose	0	50	150	500	1500	5000
Chaos	71.8	65.9	54.9	36.8	22.5	21.2
Fuzzy	68.5	61.8	52.1	34.8	20.7	10.4
AIC	68.4	62.4	53.0	35.0	21.3	10.6
Mean	68.4	61.8	52.2	34.7	20.8	10.5
RSS	Dose	61.9	52.1	34.7	20.6	10.4
Medi	68.3	61.7	53.1	34.8	20.6	10.4
Peak	68.3	62.2	52.1	34.9	21.5	10.6
Max	78.2	71.8	60.0	43.1	28.9	17.1
Min	46.7	41.1	34.4	21.7	12.4	6.9
F-test	2.17	2.17	2.17	2.17	2.17	2.17
t-test	2.03	2.02	2.03	2.03	2.03	2.02
EFD	0.18	0.17	0.19	0.17	0.17	0.18

ABBREVIATION

Chaos: Li.Yoku theorem in Chaos theory algorithm.
 Fuzzy: The center of gravity in 20 step member's function
 AIC: A (Akaike) Information Critical factor
 RSS: Root Sum Square [see Eq. (1)]
 Medi: Central value in normal distribution
 Peak: peak point. in normal distributio
 Max: Maximum value in uniform distribution
 Min: Minimum value in uniform distribution
 EFD: Effective Freedom Degree
 F-test: k of normal distribution
 t-test: k of t-distribution

The measurand of uncertainty in measurement made the fundamental statistics quantity based on Type A in ISO-GUM. In Table VI, the red number showed the same value by reagent concentration. It can be set up as a reference value. The evaluation of reaction performs affinity unit (%) The calculation result of coverage factor k is set to 2.2.

Fig. 8 shows result of two way layout ANOVA. The test of the homogeneity of slopes by F-test has found out the interaction that is occurs between calibration curves by sample No. 330 and No.72. There shows to occur between two calibration curves as an interaction. It increases an error and occur incorrect judgment. No 31 is calibration curve that make maximum value association, and No 72 is calibration curve that make minimum value association. Ordinate is affinity (%) of reagent. Abscissa is the dose of reagent.

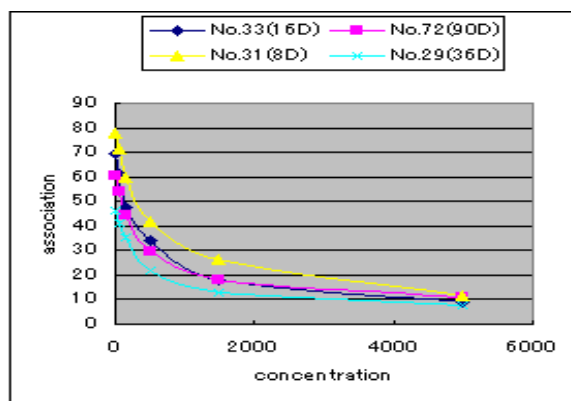


Fig. 8 Interaction occur at high concentration zone

C. Third Step (PDF data)

Third step data shows the analysis graphs of PDF by ANOVA in from Fig.9 to Fig.12.

Fig 9 shows the pareto graph which is the measurand (A) and quasi normal (B), it is the Elastase-1 of 0 dose data.

Fig 10 shows the pareto graph which is the measurand (A) and quasi normal (B), it is the Elastase-1 of 5000 dose data.

Quasi normal (B) are made by regression analysis of measurand, and it piles up quasi normal distribution curve on bar graph.

Two regents are chosen as central dose from 6 sorts doses that are maximum dose and minimum dose.

Fig.11 shows pile up line graph of six kind doses that are quasi normal distribution curves as the Erastase-1. All graphs shows difference form and peak position as abnormal distribution.

Fig. 12 shows pile up line graph of six kind doses of measurand distribution curve of the Erastase-1. Six quasi normal distribution shown all abnormal distribution, Ordinate is the account of frequency of total 320 sample sets. Abscissa is affinity that is divided into 20 steps between maximum and minimum affinity effective.

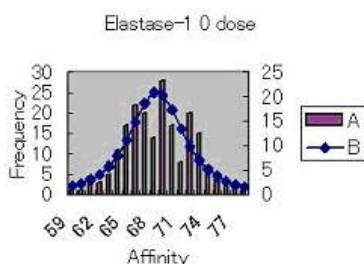


Fig. 9 A pareto graph of measurand and quasi normal PDF of 0 dose Erastase-1

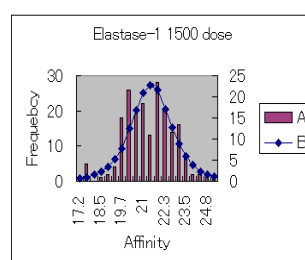


Fig. 10 A pareto graph of measurand and quasi normal PDF of 1000 dose Erastase-1

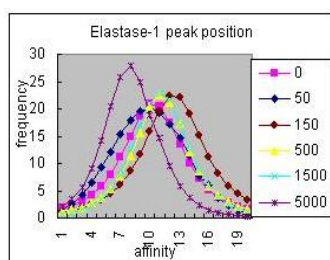


Fig. 11 A pileup graph of six quasi normal distribution curves of the Erastase-1.

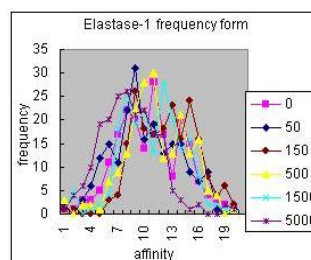


Fig. 12 A graph is piled up on six PDF the measurand of the Erastase-1.

D. The fourth step (CDF data).

The fourth step is analyzed uncertainty factor buried into the result obtained in the first step by the ANOVA method. For this reason, it is seen to need created CDF. Fig.13 shows a CDF of 0 dose of Elastase-1 of Fig.9. The CDF has been the form of sigmoid and bending seen in some position which it is suggested abnormalities condition existed in a reaction result. In Fig.13, the reagent kit is divided into three groups and it shown influence to verify of how difference between in reagent kits.

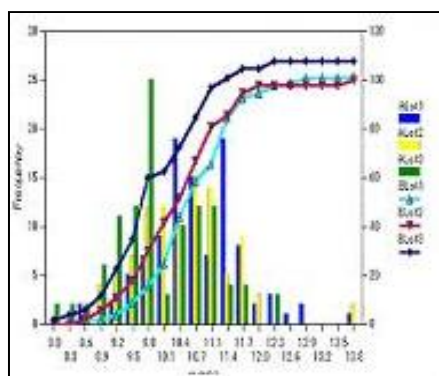


Fig. 13 Elastase-1 0 dose of 3 rot CDF

The ordinate is the frequency count of total 320 sample sets which are divided into one group (120 samples set) and two

groups (100 samples). The abscissa shows affinity (%) which all graphs quote variation of affinity that divided into 20 ranks between maximum and minimum.

All CDF results (including the four sorts of other dose) showed a state of an abnormal state of an abnormal distribution similarity and not same as form. It is seemed all sigmoid type curve. The abnormal of PDF should be required to use nonparametric test and nonlinear analysis. In this case is necessary to analyze a fault element by FTA for abnormal bend position on fourth stage. It has to process regression by MA for abnormal distribution. Next step is to acquire further high quality accuracy by ISO-11095, it is to fund out of care point. These results needed to does the EDA analysis by Stochastic Volatility model further.

E. Five Step Data

This experiment is investigated further for accuracy of the defect found by the data of PDF. Since Eq.(4) is two variables of time and reaction products, they are analyzed also variance for time by multi-variable analysis (MA) algorithm on supplement 3 on multi-regressions analysis with two-stage the least squares method in supplement 5 of ISO-GUM. It used two reagents which are Elastase-1 and the Plasma Rennin Activity in this experiment. The results were shown in Fig.14 and Fig.15.

Fig.14 shows data to second stage MA of SD value variance which changes for storage days of the Elastase-1 data.

Fig.15 shows data to second stage MA of SD value variance which changes for storage days the Plasma Rennin Activity. In the both figures, SD value is seen to be unsteady with cycle that is variable by biological rhythm of the 28 days period change of biomaterial. The necessity that it is careful on the use day of a reagent was made by getting to know periodic variance. It reports the final data of uncertainty in table VII.

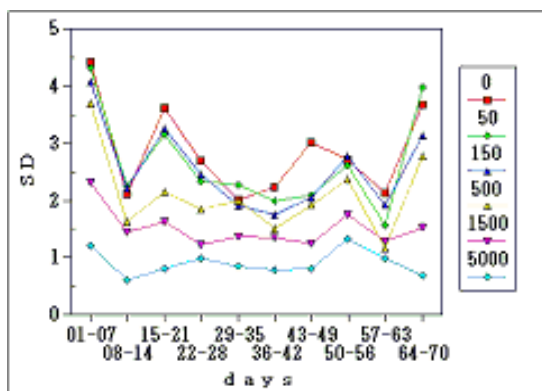


Fig. 14 Change state of SD value in storage period of ELasterse-1

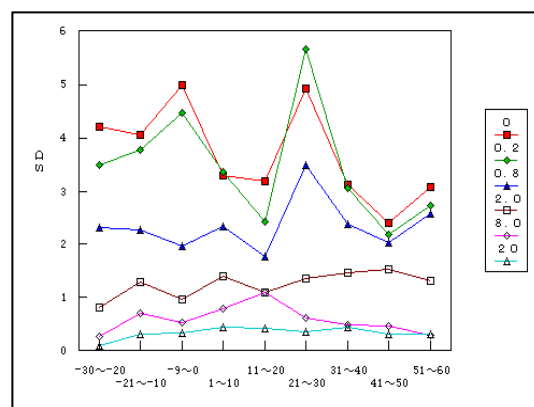


Fig. 15 Change state of SD value in storage period of Plasma Rennin Activity

TABLE VII THE RESULTS OF CONFORMANCE ZONE BY MCMC

Item	Dose	0	50	150	500	1500	5000
S-PDF	center	62.5	56.4	47.2	32.4	20.7	12.0
	.95UA	8.64	6.43	7.03	5.86	4.53	2.8
	A.Cz	53.8	48.0	40.2	26.5	16.1	9.2
		71.0	64.9	54.2	38.3	25.2	14.8
Nor.D	center	68.3	62.2	52.1	34.9	21.5	10.6
	.95UA	7.26	6.54	6.11	4.51	3.11	1.84
	B.Cz	61.7	55.0	46.0	30.3	18.4	8.76
		76.9	75.6	58.1	49.6	24.6	12.4
C.U		11.2	10.7	9.22	7.32	5.40	3.29
A.Z		62.4	56.8	46.1	31.3	18.8	9.0
		73.9	67.7	56.7	38.6	24.2	12.2

ABBREVIATION.

S PDF: Square probability density frequency

NorD:: Normalized PDF

C.U: Combine uncertainty*

AZ : Assurance Zone (=confidence interval)

0.95UA 0.95% $\times$ 2 Type A uncertainty

0.95UB 0.95% $\times$ 2 Type B uncertainty

A.Cz: Type.A Conformance zone*

B Cz Type.B Conformance zone*

*mark of items is which the upper row is upper limit (AL) and the low berth is low limit (TL).

All the measurands sited to domain of AZ can be a candidate for assurance.

VI. CONCLUSION

This is investigated further for the accuracy improvement of the fault found by the data of PDF. This paper .has discussed about the reliance and the assurance to a result of a chemical analysis. It would like the quality data to be equivalent at the highest level also in when and where. And it gets to know the limit of inference and expiratory improvement in accuracy to the last. It is more important for risk management to get to know the limit made safe than getting to know risk factor. The simulation for safe reservation is important technology. This research proved the Bayesian theory of MCMC work In the biochemical analysis field is increasing with improvement in analysis accuracy and sensitivity. The problem predicated to occur newly needs to continue research further, without being satisfied with the present situation which progressed. For

example, it is investigating correctly the apoptosis which is change of the obstacle of cell by cancer or ionizing radiation.

The solution in question is also in field which needs R&R mostly. The further development in biochemical analysis is expected. [11]

The social technology is established to construction of technical based health care quality control for safety and relief within ISO-15189, Medical Laboratory Quality System (MLQS) [12] must correspond with the newest laboratory technology to patent.

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